

# Natural and Technological Risks: Hydrometeorological Hazards Update

OCTOBER 2015

## HYDROMETEOROLOGICAL HAZARDS SUBSECTOR OVERVIEW

Climate, weather, and water-induced disasters—such as floods, droughts, cyclones, and tsunamis—account for the largest number of natural disasters worldwide and affect more people than any other type of natural hazard. Floods, storms, droughts, and extreme temperatures claimed approximately 600,000 lives, affected more than 3 billion people, and caused an estimated \$2 trillion in economic damages over a 20-year period between 1994 and 2013. In the last four decades, the number of reported hydrometeorological disasters has increased nearly fivefold, from approximately 750 incidents between 1971 and 1980 to 3,500 events between 2000 and 2010.

In FY 2015, USAID's Office of U.S. Foreign Disaster Assistance (USAID/OFDA) provided approximately \$11 million in support of hydrometeorological disaster risk reduction (DRR) activities. Hydrometeorological DRR assistance reduces populations' vulnerability to climate and weather hazards through an integrated and multi-sector approach that addresses community needs while emphasizing locally sustainable and environmentally sensitive measures. USAID/OFDA works closely with vulnerable communities, as well as national and local governments, international and regional organizations, universities, and non-governmental organizations (NGOs) to increase resilience to climate- and weather-induced disasters.

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## ENHANCING GLOBAL FLASH FLOOD GUIDANCE AND EARLY WARNING SYSTEMS

Each year, flash floods result in an average of 5,000 deaths globally. In an effort to reduce the loss of life and the economic impact of floods, USAID/OFDA—in partnership with the UN World Meteorological Organization (WMO), the National Oceanic and Atmospheric Administration (NOAA), the Hydrologic Research Center, and the national meteorological and hydrological services (NMHSs) of host countries—initiated a collaborative program in 2008 to assist NMHSs in monitoring potential flash floods, thereby improving early warning lead time ahead of disasters and enabling quick responses. Through new technologies, forecaster trainings, and technical assistance, the program aims to provide flash flood early warning guidance in countries where no such early warning capacity exists. In FY 2015, USAID/OFDA continued supporting the initiative, with systems operational or in various stages of development in more than 55 countries in Latin America, the Caribbean, the Middle East, South Asia, Southeast Asia, Central Asia, southeastern Europe, and southern Africa.



Forecasters, including the USAID/OFDA senior hydrometeorological hazards advisor, participate in an initial meeting on flash flood guidance for Central Asia. (Photo courtesy of Turkish State Meteorological Service)

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## STRENGTHENING FLOOD EARLY WARNING SYSTEMS IN MALAYSIA

In December 2014, northern and eastern Malaysia received nearly 40 inches of rainfall over a 10-day period and experienced catastrophic flooding that took many communities by surprise due to a lack of early warning. In January 2015, the Government of Malaysia (GoM) requested technical assistance from the U.S. Government (USG), and in the spring, the USG deployed a team of technical experts to conduct an assessment of existing GoM capabilities and identify areas for improvements. Representatives from USAID/OFDA, NOAA, and the U.S. Geological Survey (USGS) visited the flood sites and met with key personnel from the Malaysian Meteorological Department, the Malaysian Department of Irrigation and



Floods caused significant damages in northern Malaysia in late 2014. (Photo by Curtis Barrett/ USAID)

Drainage, the Malaysian National Security Council, and local and national NGOs. On the last day of its visit, the USG delegation held a workshop to raise awareness among various Malaysian disaster managers and DRR experts of the need for an end-to-end early warning system that would advise communities of possible flooding or other hydrometeorological disasters. USAID/OFDA and other USG staff have produced a report detailing their findings and recommendations to improve existing flood early warning systems, and the GoM is reviewing the report to determine next steps for further technical assistance and engagement.

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## **PREPARING FOR COASTAL FLOOD INUNDATION FROM STORM SURGES IN HISPANIOLA**

Coastal flood inundation is a major cause of flooding in many countries. Unfortunately, most countries do not have the capability to generate storm-surge forecasts, thereby leaving the highly vulnerable populations residing along coastlines with minimal information regarding potential flood threats. USAID/OFDA, in cooperation with WMO and NOAA's National Hurricane Center, launched a project in FY 2015 to develop an integrated coastal inundation forecasting system in the Caribbean, particularly for Hispaniola, the island shared by Haiti and the Dominican Republic. The project is intended to develop a coupled storm-surge and wave-modeling system, along with products for planning and preparation. These project outcomes will serve as a foundation for future projects aiming to establish operational forecast systems and warning capabilities in Hispaniola.

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## **BUILDING RESILIENCE BY PROMOTING WEATHER READY NATION PROGRAMS**

Extreme weather is a growing threat to many vulnerable communities around the world. As populations residing in higher-risk areas such as floodplains and wetlands increase, rising sea levels—coupled with worsening climate conditions—are creating an urgent need for communities and governments to build resilience to and prepare for more frequent occurrences of droughts, floods, and extreme weather. In the United States, NOAA is helping communities plan for and respond to mounting severe weather threats through its Weather Ready Nation (WRN) program. With a strategic priority of building community resilience, the WRN program is strengthening impact-based decision support services, improving weather forecasts using science and technology, applying social-science research to improve the usefulness of information provided to the public, and expanding information dissemination efforts to enhance community readiness, responsiveness, and resilience. The success of the program has encouraged USAID/OFDA to support NOAA and WMO to expand the WRN program outside of the United States to determine whether similar success can be realized at the international level.

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## **INCREASING CAPACITY THROUGH CLIMATE VARIABILITY AND PREDICTION WORKSHOPS**

In response to increased demand for improved national and regional capacity, USAID/OFDA and NOAA, in partnership with WMO and NMHSs, have organized a series of workshops throughout the world to establish and strengthen national preparedness for hydrometeorological events. The regional climate variability and prediction workshops aim to address the cross-border nature of climate events by encouraging information exchange, including lessons learned, among meteorologists. To reduce the impact of climate fluctuations on local populations, trainings seek to increase meteorologists' capacity to produce climate information for decision-makers. In May 2015, representatives from 12 countries in the Asia and the Pacific region participated in the seventh annual workshop held in Jakarta, Indonesia. The workshop preceded the fourth meeting of the Association of Southeast Asian Nations (ASEAN) Climate Outlook Forum, which was established in late 2013 with the aim of gathering NMHSs from all ASEAN member countries to collaboratively develop seasonal weather forecasts.

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